Undergraduate Research Opportunities Program - University of Minnesota, Twin Cities

CHINESE RESIDENTIAL COMPLEX IMPROVEMENT

中国城市住宅小区的发展与改善

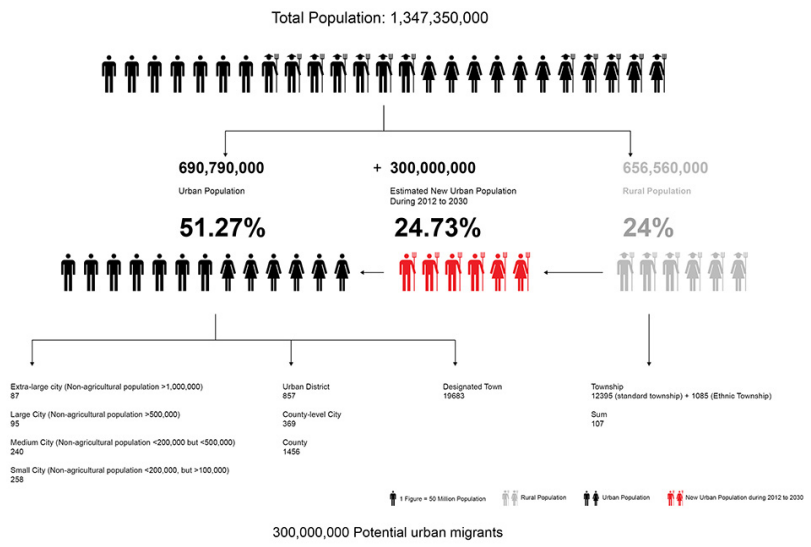
Inspired by Dutch Complex Housing

Jinguang Xie with Professor Julia Robinson - April, 2015

BACKGROUND

construction photo of the Milestone, Xi’an, China.

In the last thirty years, China has experienced a rapid development in almost every field. From light industry to high-tech industry, big cities attract tens of millions of people settle down on this limited land. Chinese residential complexes, a unique typology changes the urban fabric almost everywhere in China. With the rapid development of urbanization, the cities like Xi’an built millions of high rise residential buildings in an impossible speed. But the city has less consideration for people’s living quality in the residential complexes. A government report estimates that there will be 300,000,000 potential urban migrants in China before 2030. In other words, Chinese cities have to build more and more high-rise residential buildings to fulfill people’s demands. Less useable public ground, poor air and sunlight quality, too little distance between building and too few public facilities in the residential complex result n low occupancy and short residency. This raises the question “How can China to address these major problems and also improve its people’s quality of living?”



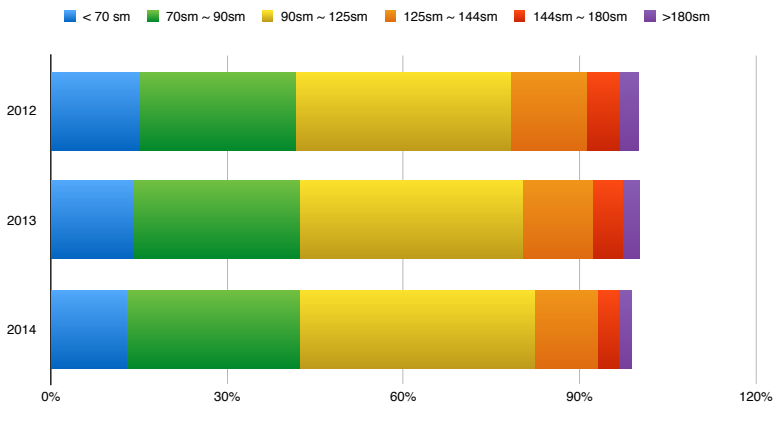
Drawing shows the potential urban migrants in China by 2030. by Dingliang Yang from Harvard GSD 2014

CHINESE RESIDENTIAL COMPLEX CURRENT PROBLEM

1. little useable public ground for residents
2. poor air and sunlight quality
3. the distance between two buildings is too close
4. few public facilities serve the whole residential complex
5. low occupancy of Chinese residential units (55%)
6. short residential using longevity (30 years)

Photos show the residents occupy the city street and plaza to do the entertainment because of the lack of useable ground space in Chinese residential complex.

Based on a government regulation (《关于调整住房供应结构稳定住房价 格的意见》): from June 1st 2006, in a new Chinese residential complex development, units that are smaller than 90sm (968sf) must make up more than 70% of the total unit amount in residential buildings. That means people cannot improve their living quality by increasing the unit size. And because of the bad living condition in the old complex, people are eager to purchase new apartment to improve their life. This situation encourages the developers build too fast, and also to ignore living quality in a residential complex. After people purchase a new unit, most of old ones are vacant because people won’t sell it until they really need money. Thus the longevity of each residential unit is very low in China, about 30 years.



Charts show the unit demands changes from 2012 - 2014 by Jinguang Xie

INSPIRATION FROM THE DUTCH COMPLEX HOUSING

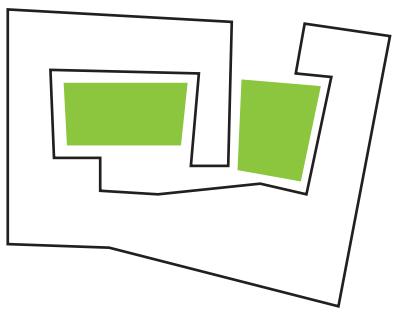
The Dutch Complex Housing Apporach
(Versus the US Approach)
by Julia Robinson

1. Development Unit is the block versus the building
2. Organized around courtyards rather than set back from the street on the site
3. Inclusion of non-housing functions
4. Orientation of unit to at least two sides (maximize light and air)
5. Limited use of double-loaded corridors
6. Employ row housing on the ground floor
7. Inclusion of outdoor space in most units
8. Mix lifestyles & income levels
9. Combine ownership and rental
10. Maximize sense of direct access to own unit

Photo shows the east courtyard of La Grande Cour, Amsterdam.
by Julia Robinson

De Zilvervloot, Dorderecht
AUAI, 2005 129 Units

De Zilvervloot is located in the center of Dordrecht. This residential complex contains 129 units, galleies, restaurants and a new shopping mall. Because of variety of materials, colors and shapes used in this design, the building looks chaotic and excessive at first sight. The shape of this building is based layout around couryards. The architects open up the ground floor and invite people to go into the central courtyards, one commercial and one residential. This strategy encourages social communication, and creates a proper relationship between the building and public.



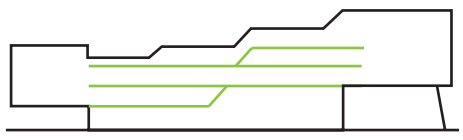
plan

Drawing shows the building organized around the two courtyards, De Zilvervloot.
by Jinguang Xie

Photo shows the entrance of public coutyard, De Zilvervloot.
by Julia Robinson

De Opgang, Amsterdam
KCAP, 2010 168 Units

De Opgang is situated at one of the important crossings in the urban extension masterplan in Amsterdam. It combines several different programs in one building: 79 dwellings, a church, a child day care center and a parking garage. The architects want to unite all these different functions in one building, therefore, it creates a mixed community. The stepped green roof responds the surrounding context. And the exterior hallway on each floor creates an open circulation as well as a social space in the building. This project also has two courtyards, one for the childcare center and the other for the residents.



elevation

Drawing shows the stepped roof and the exterior hallway, De Opgang.
by Jinguang Xie

Photo shows the stepped roof and the building relationship to the street, De Opgang.
by Julia Robinson

The Whale, Amsterdam
Cie, 2000 214 Units

The Whale is located in a redeveloped harbor district in Amsterdam. It contains a total of 214 aparments, commercial space, an interior courtyard and an underground car parking. The sloping roof and elevated underbelly ensures that all the dwellings and the courtyard garden enjoy sufficient sunlight, fresh air and open views and generates the requisite variation in housing types. This iconic sculptural form creates a unique typology in a low-rise dwelling based urban texture.

elevation

Drawing shows the sloping roof and the elevated underbelly, the Whale.
by Jinguang Xie

Photo shows the angled roof and surrounding context of the Whale.

CURRENT PROJECT INFORMATION

The Milestone (金泰 新理城), Xi'an, China

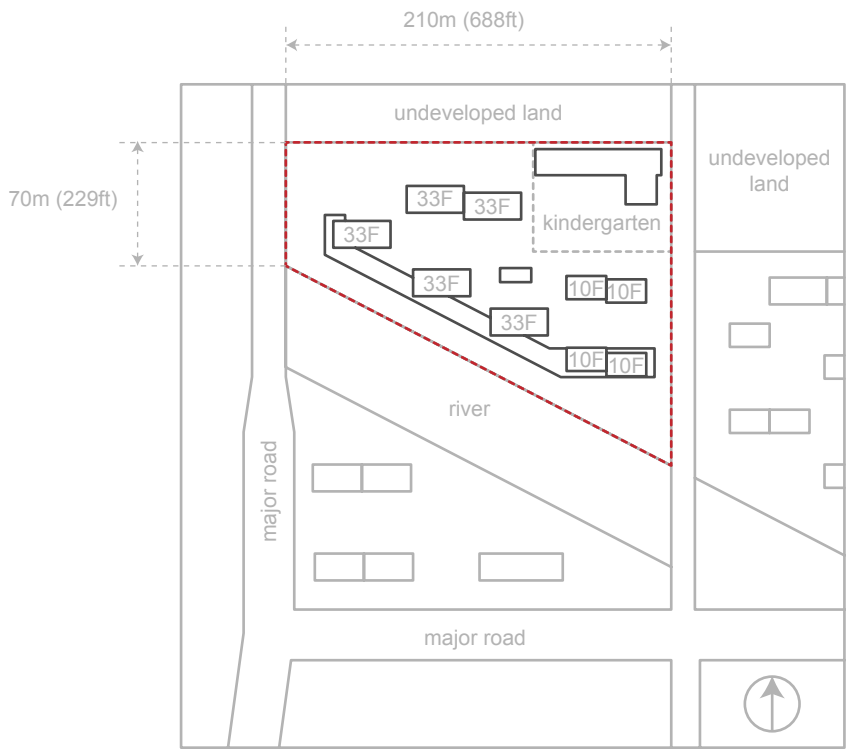
W&R Group, 2014　698 Units

The Milestone is located in Xi'an, the capital of Shaanxi province, the northwest part of China. Accoring to the 2010 Census, Xi'an has an urban population of 5,566,711 in its built-up area. It is the most populous city in northwest China. Compared with the fully developed cities in China like Beijing and Shanghai, Xi'an has more development potential than them.

The Milestone is a very typical residential complex in Xi'an as well as in China. It contains totally 698 units, 800 parking space, a kindergarten and commercial used buildings. The residential buildings consist five 33-stories high-rise buildings and four 10-stories mid-rise buildings. High-rise building owns the unit has the size from 80sm (861sf) to 110sm (1184sf), and mid-rise building has the unit size from 140sm (1506 sf) to 190sm (2045sf). This combination is very typical in Chinese residential complex.

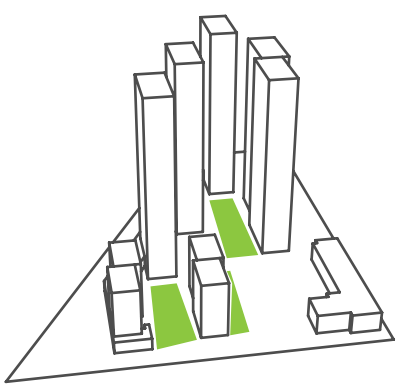
map shows the location of Xi'an in China

rendering image of the Milestone, Xi'an, China. by W&R Group, 2014



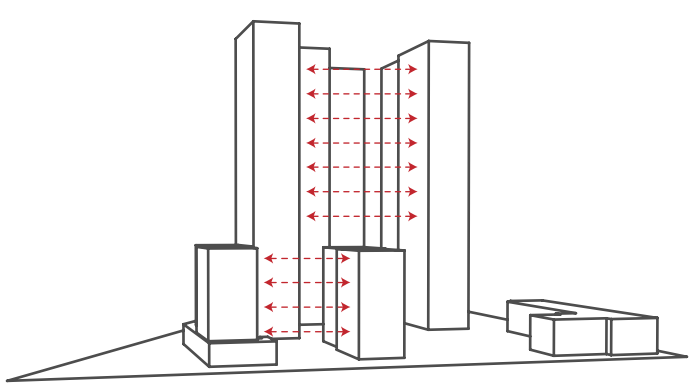
site map of the Milestone, Xi'an, China.

CURRENT PROBLEM ANALYSIS



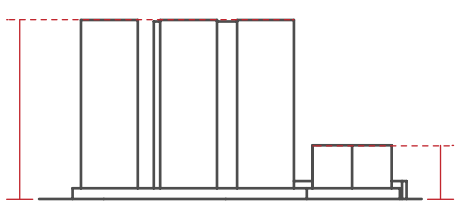
little useable ground

Because of the unthoughtful layout of the buildings, residents have less useable public ground to use. Then they occupy the city streets and plazas to do entertainment. It brings a big problem to the city. Some cities already draft regulations to solve this problem.



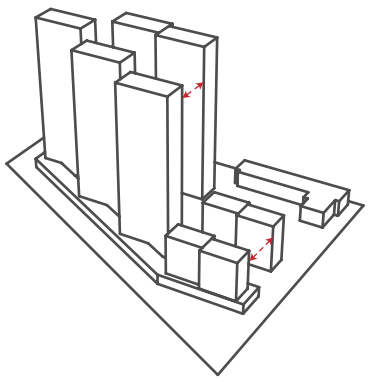
terrible view

The simple building layout doesn't consider the view of each unit. Most units are blocked by adjacent buildings. Residents live in a "hermetic" atmosphere.



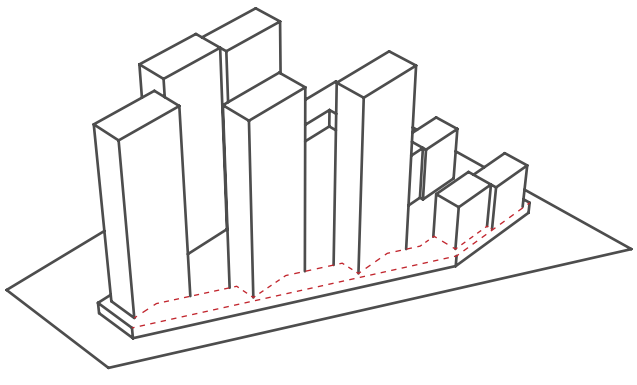
same building heights

Same building height makes city too rigid. Because the large amount of high-rise residential buildings in the city, they play an important role to shape city's fabric. But too much repetition reduces the energy of the city and makes the city too boring.



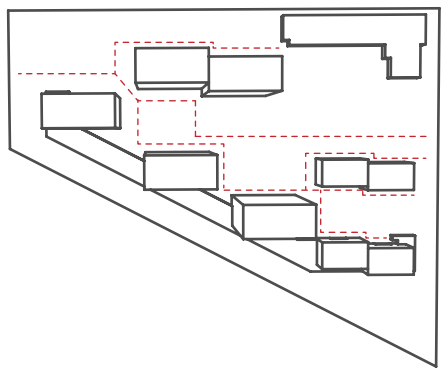
small space in between

The distance between two buildings is too small. This makes a poor air and sunlight quality in the residential complex. Current building layout is just a simple alignment of two types of identical blocks. with little consideration of the street and the site.



unrelated building edge

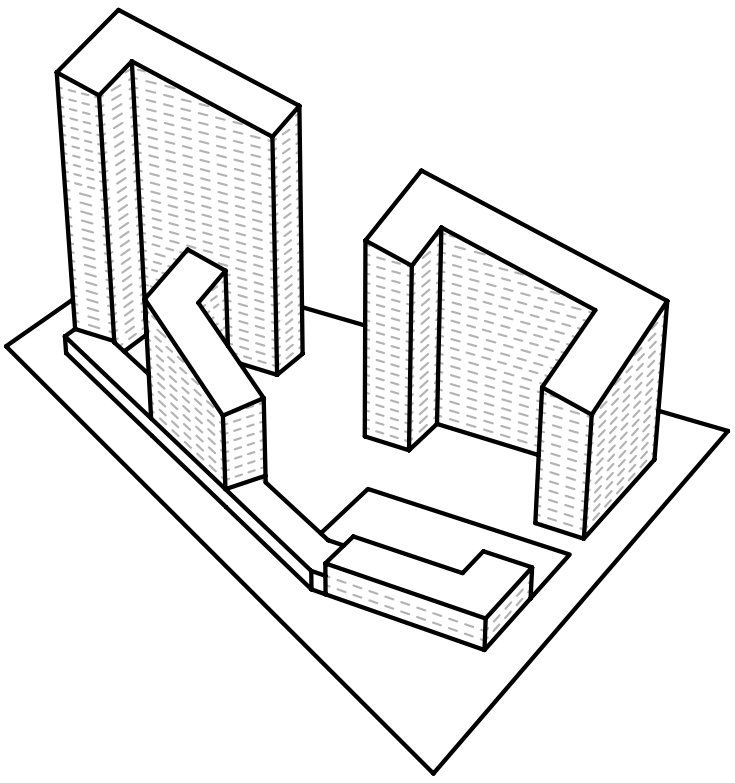
Building edge doesn't respond to the street and site well, it makes some space on the ground very hard to use. People cannot find a clear relationship between the building and the street, the city loses the original order.



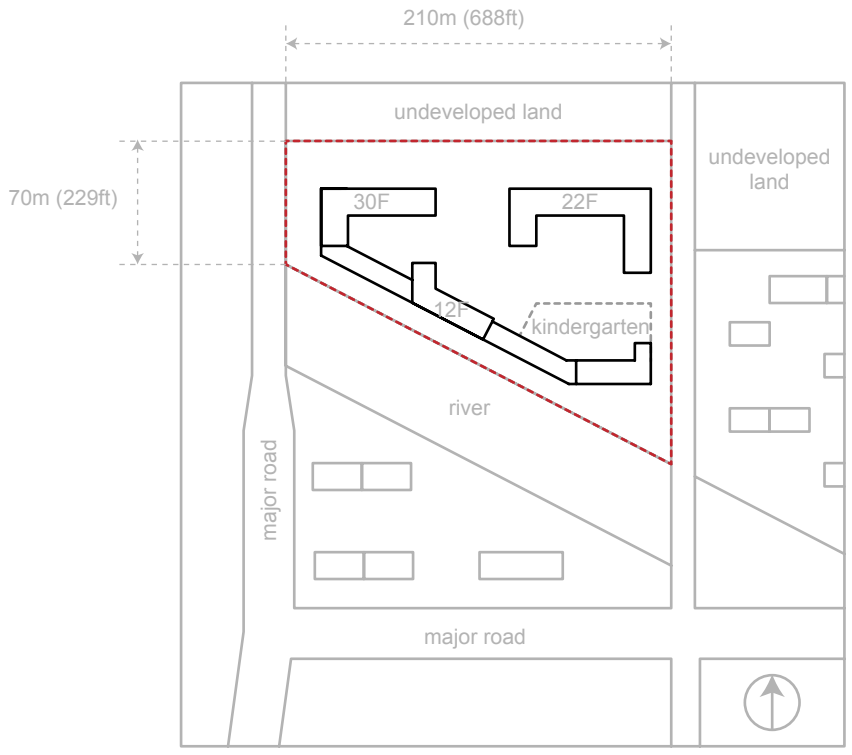
complex circulation

The circulation in the complex is complicated and hard to use. There is no clear separation between circulation and courtyard. The paths in the complex also reduce the size of the useable ground public space.

NEW PROPOSAL



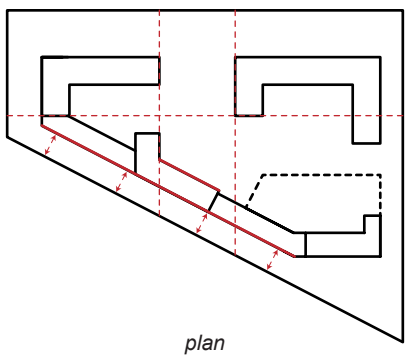
perspective drawing of the new proposal



site map of the new proposal

Considered Building Edge

In the Dutch Complex Housing design, the architects have several successful strategies to deal with the ground floor with the street. In the new proposal, the building layout has to along the site edge, the residential can build on the top of two-story commercial buildings. Therefore, the building edges are parallel to the street, it creates a basic relationship between the building and street. This strategy solves the problem of the irregular shaped site. The city then will have a better look after this small change. Another good thing brings by this change is it can enlarge the central courtyard space. Building layout creates several small blocks in the complex and makes the ground space orderly.



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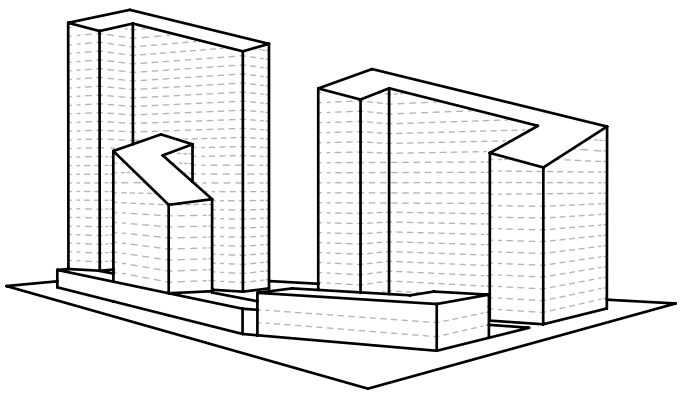
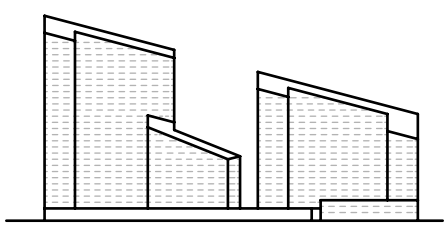


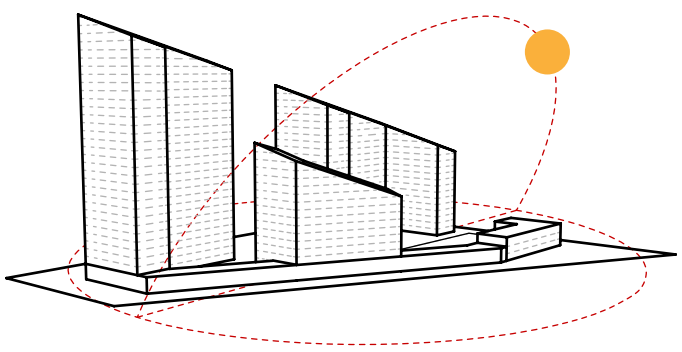
drawings show the building edges and the inner block

Sun & View Access Design

Sunlight is one of the most important part in Chinese complex design. Government has laws and regulations to drive architect to design a better residential. But the simple repetition of the building doesn't respond sunlight very well. Therefore, a sun access design strategy is important. The building height doesn't need to be the same. Based on the sun angle, architect can use sloping roof or stepped roof in the entire complex design. It can brings more sunlight to the second row or the third row of the building. The buildings don't need to be aligned, big gap in between is good for air, sunlight as well as the view of the residents. Furthermore this design provides many more units with an unencumbered view of the city.



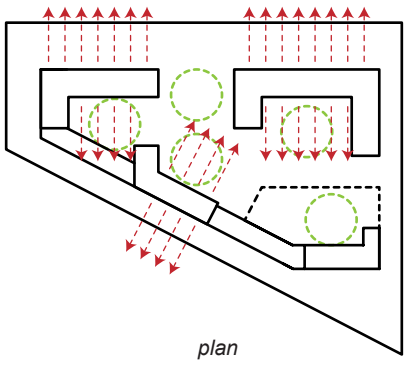
elevation



drawings show the sloped roof based on the sun angle

Courtyard Oriented Design

Insufficient useable ground in the Chinese residential complex creates some serious problems in the cities. The basic reason is that the courtyards are too small to use. Following the first strategy, the unique layout can increase the amount of central courtyard space without making any single courtyard too large to supervise. Another important strategy is providing each building with its own small courtyard and the connection of the courtyards . The architects' role needs to go beyond building layout to develop exterior spaces.



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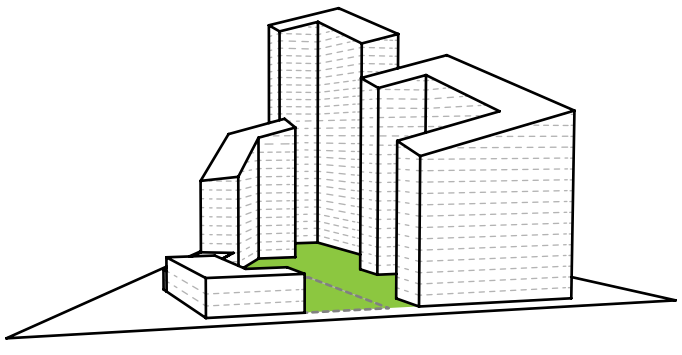

drawings show the connected courtyards and unit's two-side view